REMARKS/ARGUMENTS

Claims 1-25 remain in this application. Claims 1, 4, 9, and 12-15 have been amended. Claims 20-23 have been withdrawn as a result of an earlier restriction requirement. In view of the examiner's earlier restriction requirement, applicant retains the right to present claims 20-23 in a divisional application.

Claims 4, 12 and 25 are rejected under 35 USC 112, first paragraph, as failing to comply with the written description requirement.

The Office Action stated that the amended claims 4 and 12 do not include support for the language of "at least 5 micrometer". Accordingly, Claims 4 and 12 have been amended to specify that the protective coating is 5 to 100 μm thick. The upper range of 100 μm is supported, for example, by the original claims 10 and 12.

The Office Action stated that the newly added claim 25 is not supported by the Specification, because the Specification does not disclose a fuel cell device without a bipolar plate. Applicants respectfully disagree with this assertion. For example, Figure 1 of the Application shows an embodiment of the fuel cell device that does not include a bipolar plate. Instead, this device includes a frame 50 that supports the device by supporting its periphery, and is not in contact with the electrodes. This drawing also illustrates that frame 50 is covered by a protective coating 60. Accordingly, the subject matter of claim 25 (and its base claim 24) is fully supported by the Specification.

The rejections under 35 USC 102(b), on claims 1-8, as anticipated by Quadakkers et al are maintained. Claims 1-18 are rejected under 35 USC 102(b) as being anticipated by Quadakkers et al (US Patent 5,733,682).

Claim 1 specifies calls for two components. One is a non-electrically active (i.e., nonconductive component). The other is a protective coating situated on at least one

surface of this component. The a non-electrically active component is situated in close proximity to the electrolyte and comprises at least one metal or metal oxide capable of, at temperatures of above 625°C, (i) migrating to the surface of said component, and (ii) being re-deposited on the at least one electrode. The protective coating prevents this metal or metal oxide (e.g., Cr or chromia) from living the surface of the non-electrically active component.

The Final Office Action (pg. 4, item 11) states "The reference further discloses an alumina oxide scale formed to protect and to provide resistance to highly conductive areas (Column 3, lines 1-5)." Applicants respectfully disagree with this statement for the following reson: Column 2 (last line) to column 3 (lines 1-6) of the cited reference state that aluminum is applied at "gas containing region" or "internal surfaces of gas passages", and not "to protect and to provide resistance to highly conductive", as stated by the Examiner. In fact, Col 3, lines 3-6 of the reference expressly state the slowly growing Al_2O_3 scale is formed in these passages, "whereas at the contact areas between the interconnector and the electrodes, the highly conductive cromia scale is formed. That is, contrary to the Examiner's assertion, alumina scale is not present in highly (electrically) conductive areas between the interconnector (i.e. bipolar plate) and the electrodes. Instead a highly conductive cromia scale is formed in these areas. (See illustration A, below.)

Page 5 of the prior Office Action states that the cited reference (Column 1, lns. 39-41) discloses that the fuel cell could be a single cell, and also states that this would prevent the bipolar plate to be an electrical connector and would make it only function as a

(non-electrically conductive) frame. Applicants respectfully disagree with this assertion for the following reasons.

I. Column 1 (lns. 43 and 50) of the cited reference itself states that the bipolar plate **must** have good electrical conductivity. Accordingly, the bipolar plate is not a non-electrically active component as called for by Applicants' claims 1-8, 19. Fig. 3 of the Quadakkers reference show the current flowing through the bipolar plates of the fuel cell. **Thus, the bipolar plate can not be an electrically conductive (i.e. electrically active) component.**

Even if we assume, arguendo, that a single cell fuel cell device is to be used by itself, without connecting it any other fuel cells devices, the cited reference does not teach that an electrically conductive bipolar plate will no longer needs to be used. In fact, the single sell fuel cell device would still have to be electrically connected to an outside world. Secondly, the cited reference itself teaches (Col. 2, lns 31-35) that the voltage that can be obtained by a single cell fuel cell device "is low" and that "a large number of fuel cells **must** be connected together. **For this purpose**, a **further cell component is required**, namely the bipolar plate or interconnector". That is, the cited reference itself teaches that the purpose of the bipolar plate is to interconnect the cells and implies that it serves no other purpose. Thus, the cited reference does not teach or suggest that the bipolar plate is needed for a single cell device. Column 1 (lns. 43 and 50) of the cited reference itself states that the bipolar plate **must** have good electrical conductivity. Accordingly, the bipolar plate is not a non-electrically active component as called for by Applicants' claims 1-8, 19.

II. If the Examiner considers Cr_2O_3 to be the C (Cr_2O_3 layer is described in column 2, lns 10-15 of this reference), than the Examiner is mistaken because the cited reference itself states that chromia scale is **highly** conductive (see col. 2, lns. 4-6 of US

5,733,682 reference). This is done to enable the bipolar plate to perform its function- i.e., to allow it to be electrically active.

III. The bipolar plate, with or without the chromia layer has to be electrically active because otherwise it will not be able to perform its intended function. In order to keep the bipolar plate electrically conductive the reference teaches that the Al/Al_2O_3 containing layers are removed from the end faces of the ribs (see Fig 2, for example and col. 3, lns. 58-62). Thus Al rich layer only line the walls of the gas channel and do not interfere with electrical conductivity of the bipolar plate.

Thus, the cited refernce does not teach, disclose , or suggest an non-electrically active component as called by the applicants claims.

With regard to claims 1, 5, and 8, in discussing this reference, the office Action (pg. 4), states that "The reference further discloses an aluminium oxide scale formed to protect and provide resistance to the highly conductive contact areas (Column 3, lines 1-5)."

Applicants respectively disagree with this assertion. In fact, these lines teach that "in contact areas between interconnector (i.e., bipolar plate) and electrodes, the highly conductive chromia scales are formed". That is, there is no protective coating at the contact areas! The protective alumina oxide scales are formed elsewhere. As discussed above, Column 2, lines 50-58 of the reference further support Applicants' assertion by describing that the "alumina enriched layer is removed from the contact surface serving for interconnection with the electrodes." This alumina encroached layer can be removed, for example, by grinding down the ribs to their final height (see Column 3, Lns. 38-43 and Fig. 2 of the cited reference).

Furthermore, claim 1 (and thus its dependent claims 5 and 8) specifies that the fuel cell device includes at least two of the following components: (i) a non-electrically active

component, and (ii) a protective coating situated on that component. On page 6 of the Office Action, the Examiner states "Secondly, the bipolar plate is electrically active, but the metal oxide on the bipolar plate is not". Thus, the bipolar plate is not a "non-electrically active component" called for in Applicants' claim 1. The chromia oxide is electrically conductive also. The thin aluminum oxide scale (non electrically active metal oxide) disclosed by the reference may be viewed, arguendo, as a protective coating, but it is still a single component and can not be both as protective coating and also a separate non-electrically active component.

With regard to claim 7, the Office Action (pg. 5) stated that "the Quaddakers reference teaches 90% aluminium oxide layer is coated on bipolar plate (Column 3, Line 46) and the bipolar plate is positioned next to the electrodes. It is therefore inherent that 90% of the electrode is not coated with cromium-based alloys or chromium oxides at the onset of the solid oxide fuel cell". Applicants respectfully disagree with this assertion for the following two reasons. First, as mentioned above, the reference teaches that there is alumina- oxide layer next to the electrode. For example, Column 2, lines 50-58 of this reference teach that the "alumina enriched layer is removed from the contact surface serving for interconnection with the electrodes." Second, the 90% referred to in Column 3, Line 46, is directed to the chemical composition of the coating, not to the amount of area covered by the coating. That is, lines 45-47 state that the bipolar plate can be coated by a power mixture that contains 90% of Al_2O_3, chloride/fluride activator (5%) and aluminium powder (5%). There is no teaching or suggestion that "at least 90% of the electrode surface area is not covered by the oxide of said at least one metal", as called for in claim 7. In fact, because the cited reference teaches to remove Al_2O_3 from the bipolar plate areas adjacent to the electrodes, and because the reference itself teaches that in these areas "the highly conductive chromia scales are formed" (See Column 3, lines 4-6 of the cited reference), Applicants believe hat the reference itself implies that the large amount of electrode surface area is probably covered by chromium oxide.

Independent Claim 9 has been amended to further define the term frame. Claim 9 now calls for "a metal frame supporting said electrolyte without being in contact with said at least one electrode". This amendment is supported, for example, by Figure 1 of Applicants' Specification. No new issues are introduced by this amendment, since the examiner raised the issue of what constitutes a frame in connection to the previous amendment.

A bipolar plate it is used to electrically interconnect fuel cells, therefore it must be in the contact with at least one electrode of the fuel cell device (see Figs 1 and 3 of the reference). Thus, the disclosed bipolar plate is not a frame, as called for in claim 9. Furthermore, page 7 of the Office Action states that "A frame is by definition a rigid structure formed of relatively slender pieces, used as a major support in buildings, or engineering works, machinery, furniture, etc. The bipolar plate taught by Quaddakers et al. reference is by definition a frame."

Applicants respectfully disagree with this assertion for the following reasons. First, the bipolar plate is not a "slender piece". Unlike the frame called for in claim 9, the bipolar plate extends over the entire fuel cell device area (see reference, Figs 3, for example), it is both wide and long, so it not a "slender piece". Furthermore, if by the term "relatively slender", the Examiner means being relatively thin, than the bipolar plate does not fit this term either because the bipolar plate is one of the thickest components (if not the thickest component) of the Quaddakers' device (see for example, Figures 1 and 3 and Column 3, lines 35-38). Thus, although the bipolar plate is a load baring component, it is akin to a substrate, and is not a frame according to the Examiner's definition.

Claims 13-15 have been amended to make them even more definite. This amendment is supported by pg. 10, (paragraph [0028]) and pg. 7 (paragraph [0021]) of the Applicants' specification.

The Examiner (pg. 7) stated that claim 24 is considered a different species than that of the original claims because the recitation of "covering at least one surface" would be different from the originally elected claims, because no such requirement was present in these claims. Accordingly, claim 24 had been amended to depend from claim 1 as its base claim, and can no longer be considered a different species. As discussed in the previous amendment, a thick alumina layer or coating with a thickness of over 5 μm over at least one surface of that component, as called for in this claim, would interfere with conductivity of the bipolar plate. Accordingly, the subject matter of claim 24 is not anticipated, nor is obvious over the cited reference. In addition, the reference discloses that Al is removed from the ribs of the bipolar plate-i.e. that Al covers only portions of one surface (portions pf the air facing surface) of the bipolar plate. That is, the coating does not the cover at least one surface of the bipolar plate, as claimed by the applicants. Thus, the subject matter of claim 24 is not anticipated, nor is obvious over the cited reference.

Response to the Arguments. The examiner, on page 6 of the Office Action, states that "Air is one of the fuels for fuel cells" Applicants respectfully disagree. Although air is one of the reactants, it is not a fuel. This is known to one of the skilled in the art. The cited reference itself (Col. 1, lns. 18-20) discloses how the electrolyte (situated between anode and cathode layers) separates air from fuel. Fig. 1 of the cited reference illustrates how the air/fuel separation function is performed by the bipolar plate 1. The two illustrations B and C, below, also show schematically how this is done.

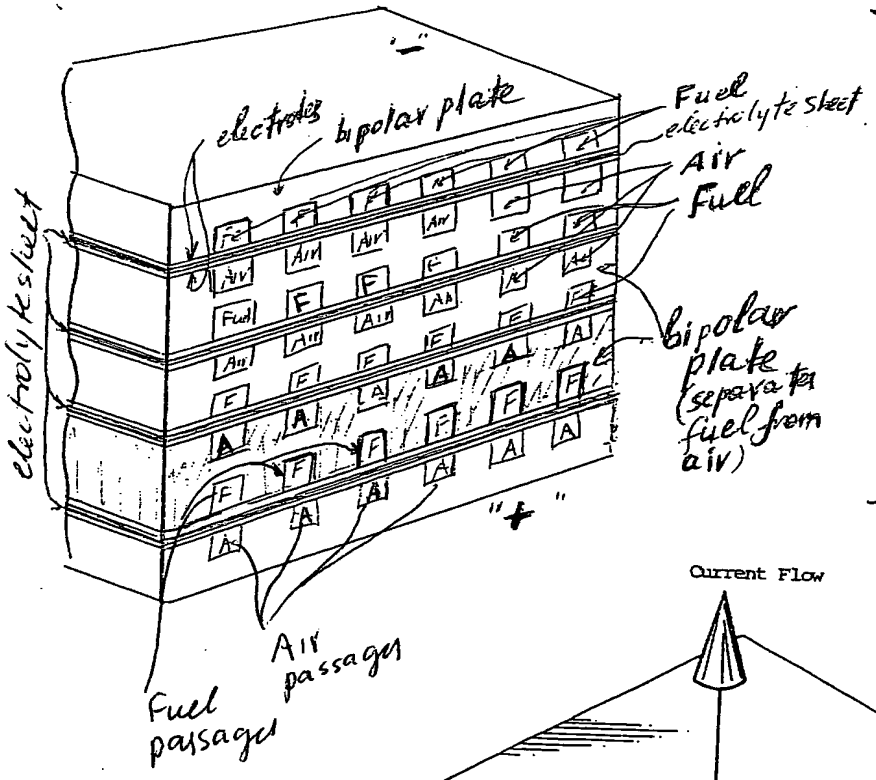

Illustration B

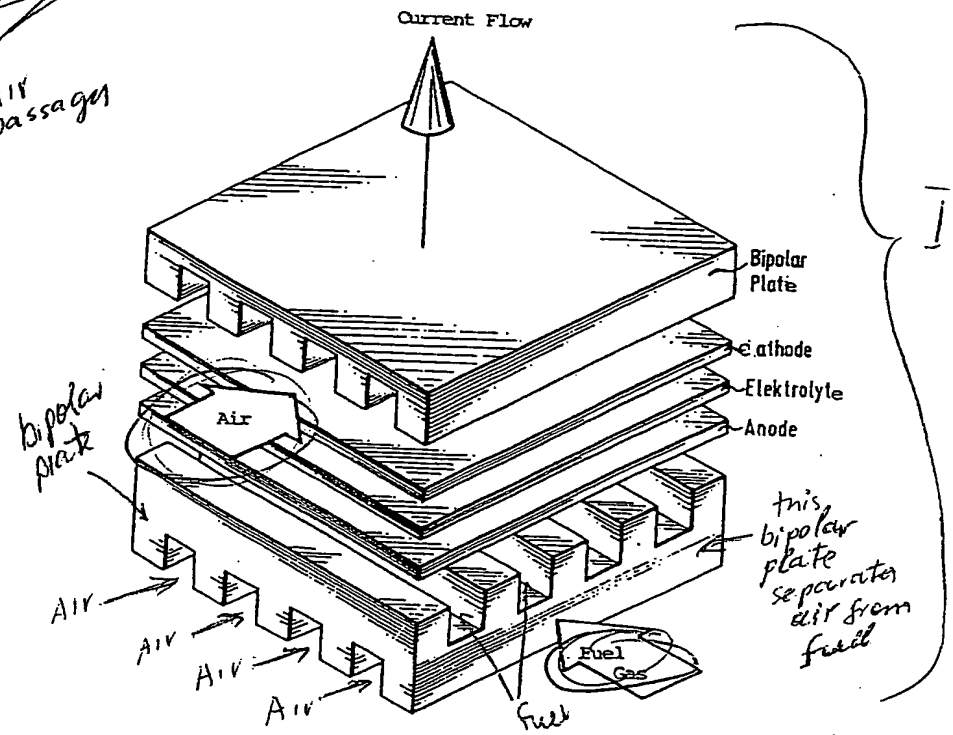

Illustration C

Conclusion

Based upon the above amendments, remarks, and papers of records, applicant believes the pending claims of the above-captioned application are in allowable form and patentable over the prior art of record. Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Applicant believes that no extension of time is necessary to make this Reply timely. Should applicant be in error, applicant respectfully requests that the Office grant such time extension pursuant to 37 C.F.R. § 1.136(a) as necessary to make this Reply timely, and hereby authorizes the Office to charge any necessary fee or surcharge with respect to said time extension to the deposit account of the undersigned firm of attorneys, Deposit Account 03-3325.

Please direct any questions or comments to Svetlana Z. Short at 607-974-0412.

Respectfully submitted,

Svetlana Short

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Svetlana Z. Short
Attorney for Assignee
Registration Number: 34,432
Corning Incorporated
SP-TI-03-1
Corning, NY 14831
Phone: 607-974-0412